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Listing of the Claims

1. (currently amended) A heterostructure containing the semiconductor alloys  $\text{Ga}_x\text{In}_{1-x}\text{As}$  and  $\text{InAs}_y\text{P}_{1-y}$  for minimizing dislocations resulting from lattice mismatch of an active, heteroepitaxial layer, the heterostructure comprising:
  - a ~~semi-insulating~~ substrate;
  - a compositionally ~~step~~-graded region terminated by a buffer layer;
  - a relaxed intermediate region;
  - an active layer; and
  - a capping layer.
2. (original) The heterostructure of claim 1 wherein the substrate is constructed from InP.
3. (currently amended) The heterostructure of claim 1 wherein the ~~step~~-graded region is constructed from  $\text{InAs}_y\text{P}_{1-y}$ .
4. (currently amended) The heterostructure of claim 3 wherein the composition within the  $\text{InAs}_y\text{P}_{1-y}$  ~~step~~-graded region is varied incrementally thereby accommodating the mismatch of the active layer.
5. (currently amended) The heterostructure of claim 1 wherein the buffer layer is a strained buffer layer constructed from  $\text{InAs}_y\text{P}_{1-y}$ .
6. (original) The heterostructure of claim 5 wherein the strained  $\text{InAs}_y\text{P}_{1-y}$  buffer layer is grown to a thickness of approximately one (1)  $\mu\text{m}$ .
7. (original) The heterostructure of claim 1 wherein the active layer is constructed from  $\text{Ga}_x\text{In}_{1-x}\text{As}$ .

8. (original) The heterostructure of claim 7 wherein the  $\text{Ga}_x\text{In}_{1-x}\text{As}$  active layer is deposited upon the buffer layer.
9. (original) The heterostructure of claim 1 wherein the capping layer is constructed from  $\text{InAs}_y\text{P}_{1-y}$ .
10. (original) The heterostructure of claim 9 wherein the  $\text{InAs}_y\text{P}_{1-y}$  capping layer is grown for electrical passivation.
11. (currently amended) The heterostructure of claim 1 wherein the active layer is constructed from epitaxial  $\text{Ga}_x\text{In}_{1-x}\text{As}$  with  $x < 0.47$ , and the step-graded region and buffer layer are constructed from  $\text{InAs}_y\text{P}_{1-y}$ .
12. (original) The heterostructure of claim 1 wherein each of the layers is deposited with a vapor-phase epitaxy technique.
13. (currently amended) A method for eliminating strain and dislocations resulting from lattice mismatch of a heteroepitaxial layer, the method comprising:
- providing a ~~semi-insulating~~ substrate;
  - depositing a compositionally ~~step-graded~~ region on the ~~semi-insulating~~ substrate;
  - terminating the ~~step-graded~~ region with a buffer layer;
  - depositing ~~[[an]]~~ a relaxed intermediate region on the buffer layer;
  - depositing an active layer on the ~~buffer layer~~ relaxed intermediate region; and
  - depositing a capping layer on the active layer.
14. (original) The method of claim 13 further comprising: constructing the substrate from InP.

15. (currently amended) The method of claim 13 further comprising: constructing the step-graded layer from  $\text{InAs}_y\text{P}_{1-y}$ .

16. (currently amended) The method of claim 15 further comprising: incrementally varying the composition  $y$  of the step-graded layer thereby accommodating the mismatch of the heteroepitaxial layer.

17. (original) The method of claim 13 further comprising: constructing the a strained buffer layer from  $\text{InAs}_y\text{P}_{1-y}$ .

18. (original) The method of claim 17 further comprising: growing the strained  $\text{InAs}_y\text{P}_{1-y}$  buffer layer to a thickness of approximately one (1)  $\mu\text{m}$ .

19. (original) The method of claim 13 further comprising: constructing the active layer from  $\text{Ga}_x\text{In}_{1-x}\text{As}$ .

20. (original) The method of claim 19 further comprising: depositing the  $\text{Ga}_x\text{In}_{1-x}\text{As}$  active layer upon the buffer layer.

21. (original) The method of claim 13 further comprising: constructing the capping layer from of  $\text{InAs}_y\text{P}_{1-y}$ .

22. (original) The method of claim 21 further comprising: growing the  $\text{InAs}_y\text{P}_{1-y}$  capping layer for electrical passivation.

23. (original) The method of claim 13 further comprising: depositing each layer by vapor-phase epitaxy.

24. (new) The heterostructure of claim 1 wherein the graded region is step-graded.

25. (new) The heterostructure of claim 1 wherein substrate is semi-insulating.
26. (new) The heterostructure of claim 1 wherein the buffer layer is a compositional overshoot which compensates for residual strain in the buffer layer such that the lattice constant in a growth plain matches that of the relaxed lattice constant of both the intermediate region and the active layer.
27. (new) The heterostructure of claim 1 wherein the intermediate region includes at least one displacement layer.
28. (new) The method of claim 13 wherein the graded region is step-graded.
29. (new) The method of claim 13 wherein the substrate is semi-insulating.
30. (new) The method of claim 13 wherein the buffer layer is a compositional overshoot which compensates for residual strain in the buffer layer such that the lattice constant in a growth plain matches that of the relaxed lattice constant of both the intermediate region and the active layer.